Health Problems and Nutritional Status among Children Under-Five Years in Diocese of Agats: A Cross-Sectional Study

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ABSTRACT: From September to February 2018, the number of measles and under-nutrition cases among children under five years in Agats reached a peak of 651 cases and 223 cases, respectively. It was reported that measles and undernutrition were responsible for 91% of child mortality in Agats. This study aimed to identify the correlation between health problems with nutritional status among children under five in the Diocese of Agats, Asmat. A descriptive quantitative with a cross-sectional approach was conducted from May to September 2018 among 39 mothers and 53 children. Data were collected by using an attendance list that consisted of mother and child characteristics, nutritional status was measured by using steelyard balance and microtoise, and the results would subsequently be converted to the standardized anthropometry: Weight for Age Z-score (WAZ) and Weight for Height Z-Score (WHZ). Results revealed that child health problems were cough and influenza (28%), febrile (1,9%), and itches (3,8%) while the nutritional status categorized normal (43.3%), underweight (33.1%), and waste (23.3%). Chi-Square test found that there was a significant correlation between health problems and nutritional status of children under-five (p-value: 0,035; CI 95% = 0,68 – 0,79). It is concluded that health problems are associated with nutritional status among children under five. It is recommended that regular health promotion to improve mothers' knowledge should be conducted by healthcare workers, volunteers, teachers, stakeholders, and the local government of Asmat Regency.

KEYWORDS: Health problem, nutritional status, children under five

I. INTRODUCTION

The Diocese of Agats is a part of the Metropolitan Archdiocese of Merauke that was established in May 1969. It is located in Agats, Asmat Regency, South Papua, Indonesia with a total area of 37.00 km2 and consists of 12 parishes (Keuskupan Agats-Asmat, 2020a). Asmat regency consists of 23 districts, 224 villages/sub-districts, and 17 public health centers (Widiantoro, 2018, January 17). The vision of Agats Diocese is to be a fraternal communion of the People of God who are mature in the faith, using the local cultural pattern "Jeu and Wair" which is illuminated and inspired by the values of the gospel in realizing salvation. To achieve this vision, the Diocese of Agats has stated its missions, including developing participatory pastoral work based on the concrete situation and values of society, developing inculturation in all life aspects of the Agats diocese church, empowering local communities to be able to fight for economic interests, education, solidarity, and equality at the family level as well as at cross-villages level, and fighting for changes in public policies in the interests of the community, collaborating with the community. The strategy to reach the vision and missions is by empowering pastoral to develop communities to be participative and transformational community (Keuskupan Agats-Asmat, 2020b).

Empowering or empowerment is a community nursing activity that actively involves the community to solve problems and make decisions at the individual, family, and community levels by changing social disparities (Anderson & McFarlane, 2015; Nies & McEwen, 2014). The vision and mission of the Agats diocese are in accordance with the Healthy Indonesia Program (Indonesia Sehat Program), which is to increase the health and nutritional status of the community through health strategies and community empowerment supported by financial protection and equity in health services. One of the targets of the Papua Medium-term Development Plan 2019/2023 (Rencana Pembangunan Jangka Menengah) is to improve maternal and child health and nutrition (Pemerintah Provinsi Papua, 2019). However, this goal has not been fully achieved. This is shown by the outbreak of measles and malnutrition which caused the death of children in Asmat District.

Studies found that there is a significant correlation between malnutrition and measles (Tran et al., 2023). The Task Force Team of the Indonesian National Army reported that from the beginning of September 2017 to February 2, 2018, there were 651 cases of measles and 223 people with malnutrition, 11 people with measles with complications of malnutrition; 72 people died,

Health Problems and Nutritional Status among Children Under-Five Years in Diocese of Agats: A Cross-Sectional Study

consisting of 66 measles and 6 malnutrition. Meanwhile, in the Jetsy District, there were 16 cases of measles and malnutrition (Sianipar, 2018, March 12).

The contributing factors of nutrition problems and measles in Asmat Regency were due to various factors, including lack of knowledge, lack of access to health services, difficult terrain, and limited health workers, such as doctors, nurses, nutritionists, and sanitarians. The other factors include infrastructure, hygiene facilities, such as toilets and clean water; economy, education, behavior, swampy soil structures, housing areas, climate changes, limited agricultural land, limited transportation with expensive fuel costs, and limited stock and supply of food for the population.

According to Marilyn, Friedman & Vicky (2019), the role of the family in meeting the nutritional adequacy of toddlers may include helping each family member meet the regular basic needs to consume nutritious food 3 times a day, including exclusive breastfeeding up to 6 months, complementary foods (MP-ASI) starting from 6 months old, and continue breastfeeding until the age of more than 24 months. Various interventions have been carried out to address the issues of nutrition and measles in Agats, such as health services (care and treatment, immunization, provision of supplementary food, provision of latrines, construction of fish-holding ponds) through cross-sectoral and cross-program collaboration between the Indonesian Ministry of Health, the Indonesian National Armed Forces, Police, and other parties. Meanwhile, the strategies adopted by the Ministry of Health to overcome malnutrition in Agats include treatment of critical cases, health service collaboration with the armed forces personnel, police, and other parties, sending medical personnel, logistics, and medicines; rehabilitation of malnutrition patients; case finding in 23 districts. From a total of 12,398 children in Asmat who received health services, it was found that 646 measles and 144 malnutrition, 25 suspected measles, 4 complications of measles and malnutrition (Kemenkes RI, 2018 as cited in Leba, 2018, January 29). The government has also provided a water pond with a capacity of more than 1000 tons, boreholes, and water pipes, and plans to build a bridge and repair damaged wooden bridges (Widiantoro, 2018, February 2). Various interventions still need to be carried out to increase community knowledge, including family empowerment in managing toddler nutrition.

Toddlers are a risk group that is prone to nutritional problems due to their immature immune systems. Therefore, under-treatment may lead to a higher risk of suffering from diseases, such as malnutrition (Gwela et al., 2019). A nutritional-focused health empowerment is expected to improve family knowledge and skills in managing toddler nutrition which might eventually prevent the impacts of malnutrition in the future.The roles of community health nurses in managing toddler nutrition include advisor, educator, and facilitator (Lundy & Janes, 2009 as cited in Batticaca & Kristina, 2017). As a patient advisor, the role includes providing support through health care services for patients; as an educator, the nurse provides education about breastfeeding and supplementary food, balanced nutrition, etc; as a facilitator, the nurse facilitates vulnerable groups on the need of nutritional aspect and initiates positive changes through special programs, such as health promotion about toddler nutrition (Allender et al., 2013; Edelman & Kudzma, 2021). This study aimed to identify the correlation between health problems and nutritional status of children under five in Diocese Agats.

II. METHOD

A descriptive quantitative with a cross-sectional approach was used to identify characteristics and knowledge of mothers, characteristics, and nutritional status of children. The sample of the study was children under five whose mothers enrolled in the community empowering program, training for mothers to make supplementary food made from pinfish in the Parish Warse District Jetsy area of the Diocese of Agats. The research was conducted from May to September 2018. To protect participants' human rights, the study was approved by the leader Diocese of Agats, the Leader of Parish Warse, the Leader of District Jetsy, the Leader of Warse Village, and all respondents. The respondents were given an information sheet explaining the study's purpose, procedure, and benefits. The samples of this study also confirmed their consent by signing an informed consent. The children who were identified as having health problems were referred to a community health center (Kemenkes RI, 2016). The research instrument on nutritional status was an instrument developed by the Ministry of Health Department Indonesia. The nutritional status was assessed by using anthropometry measurements, including a micro toise to measure height and a body scale to measure body weight. The collected data were analyzed statistically by using the SPSS program. The Chi-square test was used to analyze the correlation between the nutritional status and mother and child characteristics.

Health Problems and Nutritional Status among Children Under-Five Years in Diocese of Agats: A Cross-Sectional Study

III. RESULTS

A. Maternal Characteristics

Table 1. Maternal characteristics (n=39)

Category	n	%
Residential location		
Warse	3	7,7
Akamar	7	17,9
Birak	29	74,4
Mother's knowledge about artificial breastfeeding		
Very poor	2	5,1
Poor	19	48,7
Good	16	41
Excellent	2	5,1

Table 1 shows the characteristics of mothers, including address and level of knowledge about breast milk complementary food. The majority of respondents lived in Birak Village (74,4%), followed by Akamar Village (17,9%) and the lowest percentage lived in Warse (7,7%). Just under 50% of the respondents had poor knowledge about complementary food for breast milk while both the lowest and highest categories were at a similar proportion, very poor (5,1%) and excellent (5.1%), respectively.

B. Child characteristics

Table 2. Child Characteristics (n=53)

Category	n	%
Age (months)		
1 - 12	25	47.2
12 - 24	10	18.9
24 - 36	9	17
36 - 48	6	11.3
48 - 59	3	5.7
Gender		
Male	24	45.3
Female	29	54.7
Regency		
Warse	4	7.5
Akamar	6	11.3
Birak	43	81.1

Several specific characteristics of children are presented in Table 2. Almost half of the total children aged 1 to 12 months (47.2%), followed by children aged 12-24 months (18.9%), children aged 24-36 months (17%), children aged 36-48 months (11.3%) and children aged 48-59 months with the least proportion of 5.7%. Just above 50% of the children were female (54.7%) and the majority of the children lived in Birak (81.1)%.

C. Child Health Problems

Table 3. Child health problems (n=53)

Category	n	%
No health problems	35	66
Cough and Influenza	15	28.3
Febrile	1	1.9
Itches	2	3.8

Table 3 describes health issues that were suffered by the children. Most of the children had no health problems (66%) while identified health problems were cough and influenza (28.3%), itches (3.8%), and febrile (1,9%).

Health Problems and Nutritional Status among Children Under-Five Years in Diocese of Agats: A Cross-Sectional Study

D. Child Nutritional Status

Table 4. Child Nutritional Status (n=53)

Category (BW/A)	n	%
Waste	7	13.2
Underweight	4	7.5
Normal	42	79.2

Table 4 presents the category of child nutrition. Most of the children were categorized as normal (79.2%), underweight waste (13.2%), and underweight (7.5%).

Table 5. Child Nutritional Status according to Age (n=53)

Age (months)	Nutritional Status						Total		X2 test	p-value	CI 95%	
	Waste		Underweight		Normal							
	n	%	n	%	n	%	n	%				
0-12	3	42.9	2	50	20	47.6	25	100	0.763	0.564	0.562	0.581
12-24	0	0	1	10	9	21.4	10	100				
24-36	2	28.6	0	0	7	16.7	9	100				
36-48	2	28.6	1	16.7	3	50	6	100				
48-59	0	0	0	0	3	100	3	100				

Table 5 illustrates the nutritional status of children according to age and its association. By comparison, the group of children between the age of 48-59 had the least nutritional problem with the normal category (100%), followed by children aged 12-24 with the category of normal (21.4%), underweight (10%) and waste (0%). Meanwhile, most of the children aged 0-2 months had nutritional status in the normal category (47.6%), underweight (50%), and waste (42,9%). Children aged 24-36 had normal status (16.7%), waste (28.6%), and underweight (0%). Children aged 36 to 48 were in the normal category (50%), underweight (16.7%), and waste (28.6%). The chi-square test found there was no correlation between child nutritional status and age (X2=10.763, p-value =0.564; CI 95%=0,562-0,581).

Table 6. Child Nutritional Status according to Gender (n=53)

Gender	Nutritional Status						Total		X2test	p-value	CI 95%	
	Waste		Underweight		Normal							
	n	%	n	%	n	%	n	%				
Male	5	28.8	3	12.5	16	66.7	24	100	4.23	0.120	0.150	0.165
Famale	2	6.9	1	3.4	26	89.7	29	100				

Table 6 describes the frequency and association between nutritional status and gender of children. The group of children with nutritional problems was male with the category of waste (28%) and underweight (12.5%). While female children dominated by the category of normal (89.7%), underweight and waste accounted for 3.4% and 6.9%, respectively. The chi-square test found child nutritional status had no association with gender (X2 =4.35, p-value=0,120; CI 95% = 0.150-0.165).

Table 7. Child Nutritional Status according to Address (n=53)

Area	Nutritional Status						Total	
	Waste		Underweight		Normal			
	n	%	n	%	n	%	n	%
Warse	0	0	0	0	4	100	4	100
Akamar	0	0	0	0	6	100	6	100
Birak	7	16.3	4	9.3	32	74.4	43	100

Table 7 shows the cross-tabulation of address and nutritional status of children. By comparison, the majority of children who lived in Birak Village had normal nutritional status (74.4%), underweight (9.3%), waste (16.3%). Meanwhile, there was no children with nutritional problem in both Warse and Akamar Village (100%).

Health Problems and Nutritional Status among Children Under-Five Years in Diocese of Agats: A Cross-Sectional Study

Table 8. Health problems and Nutritional Status (n=53)

Health problems	Nutritional status						Total		Uji X2	p-value	CI 95%	
	Waste		Underweight		Normal							
	n	%	n	%	n	%	n	%				
No problem	3	8.6	2	5.7	30	85.7	35	100	5,078	*0.035	0.68	0.79
Cough and Influenza	3	20	2	13.3	10	66.7	15	100				
Febrile	0	0	0	0	1	100	1	100				
Itches	1	50	0	0	1	50	2	100				

Table 8 presents the correlation between health problems and nutritional status. Children with no health problems had nutritional status in the normal range (85.7%), underweight (5.7%), and waste (8.6%). Children with cough and influenza were in the normal category (66.7%), underweight (13.3%), and waste (20%). Children with febrile were completely in the normal range (100%). Children with iches were normal (50%), and waste (50%). The chi-square test found that there was a significant correlation between health problems and nutritional status (X2 test=5.078, p-value=0,035, CI 95%=0.68-0.75).

IV. DISCUSSION
Maternal Characteristics
The result of this study showed that almost all respondents lived in Birak Village (74,4%), while the other participants lived in Akamar Village (17,9%) and Warse (7,7%). The highest percentage of respondents were residents in Birak Village due to the location where the training was conducted. By comparison, New Warse Village and Akamar Village were located in a remote area, and the primary under-constructed bridge connected both villages to Birak Village. The poor access was exacerbated by the muddy land conditions in all villages.

Table 2 indicates that almost 50% of total respondents had poor knowledge about artificial breastfeeding. This might be related to their illiteracy and low educational background which only reached elementary school. Mothers with excellent (5.1%) and good knowledge (41%) were working as health volunteers who collaboratively worked with Wahana Visi Indonesia (WVI) and teachers in the area. Most of the mothers in this village could not identify their age, did not graduate from elementary school, and were early married from 12 to 14 years old. There were no senior high schools, if they would like to continue their study they should go to the central city or other cities. Women should work hard to meet their fundamental needs, such as fishing and hunting in the forest during low water while when water was high they did nothing and just stayed at home. It is difficult for them to do farming due to poor and muddy land conditions. The illiteracy and poor educational background of mothers, and the poor environment increased the risk of various diseases and under-nutrition (Obasohan et al., 2020).

Child Characteristics
The majority of children are infants. Infants are a group that is at risk and vulnerable to health problems. Therefore, it is essential to focus on child care and service, particularly the nutritional aspect. Based on the preliminary interview with mothers, children were usually given additional food when they were still three months old. Among the foods given are roasted sago, boiled or fried fish, and vegetables. This might lead to a higher risk for digestive problems, and diarrhea that can be related to under-nutrition.

According to gender, approximately half of the total children were female. Female children are the next generation in the future who will give birth to children therefore their fundamental needs should be taken into account and prioritized. If they suffer from malnourished, they would give birth to children who would probably have similar problems. It eventually might have negative consequences, including the inability to complete education, vulnerability to infectious diseases, cardiovascular diseases, and metabolic disorders in the future (Siddiqui et al., 2020).

Child Health Problems
The result of this study revealed that most of the children had no health problems (66%) while identified health problems were cough and influenza (28.3%), itches (3.8%), and febrile (1,9%). In 2021, health volunteers reported that most of the children under five who were active visited integrated service stations experienced ARTI, Malaria, and malnutrition. Furthermore, this study finding is also relevant to Basic Health Research (RISKESDAS) conducted by the Health Ministry of the Republic of Indonesia (Kemenkes RI, 2019) which showed that most children under five had Acute Respiratory Tract Infection (ARTI) (62.8%), Diarrhea (12.9%), Malaria (0.4%).

Health Problems and Nutritional Status among Children Under-Five Years in Diocese of Agats: A Cross-Sectional Study

ARTI is an acute respiratory tract infection caused by bacteria or viruses. Based on anatomy, ARTI can be divided into two types, namely Acute Upper Track Infection and Acute Lower Track Infection with epiglottis as the anatomy border (Maryunani, 2013). Risk factors of ARTI in Holtecamp Village consisted of inadequate and unclean house ventilation, poor environmental conditions, being surrounded by plants such as banana and palm fruits, household emission from wood smoke, insufficient water supply (most households used rainwater, river water, and pond water); poor sanitation (practice open defecation); negative health behaviors (consuming palm fruit, smoking in the house, playing on the ground barefoot, and poor hand hygiene). Febrile is a condition where body temperature increases more than 38°C. Febrile indicates any illness or other conditions in our body as the reaction of the immune system to protect from infectious agents, including viruses, bacteria, and parasites. Several illnesses cause Febrile, such as influenza, sore throat, urinary tract infection, and coronavirus-19 (Zandstra et al., 2021).

Diarrhea is the second leading cause of death in children under five years and it is responsible for 525.000 deaths of children each year. Diarrhea refers to a condition of having three or more loose or liquid stools per day (or more frequently than the normal frequency). Diarrhea may indicate the symptoms of an infection in the intestinal tract, which can be caused by a variety of bacterial, viral, and parasitic organisms. Infection is spread through contaminated food or drinking water, or from person-to persons as a result of poor hygiene. Interventions to prevent diarrhea include safe drinking water, adequate sanitation, and good practice of hand hygiene (WHO, 2017). Malaria is an acute febrile illness with an incubation period of 7 days or longer. Malaria is caused by four protozoan parasites Plasmodium, including Plasmodium falciparum, Plasmodium malaria, Plasmodium ovale, and Plasmodium vivax. The malaria parasite is transmitted by female Anopheles mosquito (WHO, 2023). Risk factors of malaria in this area included unstandardized house building, poor environmental conditions and water drainage, and negative health behavior. Both Malaria and Diarrhea might be the high-risk diseases in this area according to the environmental and demographic factors. However, it was not found in the study, it might be related to the relatively small size of the sample.

Child Nutritional Status

Table 5 shows that most of the children under five had nutritional status majority of children who lived in Birak Village had normal nutritional status (74.4%). However, children with malnutrition both underweight and waste, 9.3% and 16.3%, respectively. Meanwhile, there was no children with nutritional problem in both Warse and Akamar Village (100%). Based on the Health Ministry of the Republic of Indonesia (Kemenkes RI, 2018), the nutritional status of children under five was measured according to age, body weight, and height, which was presented in four indicators of anthropometry, including Weight for Age (W/A), Height for Age (H/A), Weight for height Z (H/A), and Body Mass Index for Age (W/H). Nutrition status evaluation is based on Z (relative deviation) to the mean of score from Z-Score can be determined by Standard Deviation (SD). The Cut of points for each nutritional status was ± 2 SD and nutritional status < - 3 SD was defined as severe undernutrition. Body weight and height are converted in the Z-Score table (Casadei & Kiel, 2022). Miller and Rodgers (2009) described how to measure the nutritional status of children by using three measurements of nutritional status for children under five, namely underweight, stunting, and wasting. Meanwhile, Puffer and Serrano (1973 as cited in Miller & Rodgers, 2009) stated that each indicator has an aspect that different for children under five growth and development. Underweight might be influenced by pregnancy period, genetics, nutrition, and maternal health during pregnancy (Sigdel et al., 2020). Stunting and wasting might be related to postnatal external factors, such as environmental factors, socioeconomic factors, and physical environment (Wali et al., 2021; Amadu et al., 2021).

Children with malnutrition were found in Birak Village. The determinant factors might include geographical factors which are swampy, muddy, and covered with tidal water. Additionally, economic difficulty might lead to limited access to the city due to costly transportation fees, and limited access to Public Health Centers due to a lack support of health workers who only had a monthly regular visit. Furthermore, the result of observation found that the majority of households lacked fruit and vegetable consumption due to swampy land conditions. Local people planted only several tropical vegetables and fruits, such as kale, banana, papaya, cassava, and chili in their backyard. The Secretary of the Village stated that people also planted some vegetables, including spinach, and long beans in the field, however, the location was far from their home residents. He also explained that environmental factors that might lead to a higher risk for health problems consisted of poor access (under-constructed bridge), and lack of clean water supply.

WHO (2021a) described that wasting is defined as a child who is too thin for his or her height. Wasting is the result of recent rapid weight loss or the failure to gain weight. A child who is moderately or severely wasted has an increased risk of death, however, it is treatable. In 2020, globally, approximately 45.4 million children under five were wasted of which 13.6 million were severely wasted. This is equivalent to a prevalence of 6.7% and 2.0%, respectively. In 2020, more than half of all children affected by wasting lived in South Asia and nearly one-quarter in sub-Saharan Africa, with similar proportions for children

affected by severe wasting. At 14.7%, South Asia's wasting prevalence represents a situation requiring a serious need for intervention with appropriate treatment programs (WHO, 2021a). Under-five wasting and severe wasting are highly sensitive to change. Thus, the estimation for these indicators is only reported for the latest year of 2020.

Nutritional Status and Child Characteristics

The results showed that the majority of toddlers in the age range of 1-12 months had normal nutritional status. The normal category in this age group was related to the provision of breast milk as a source of balanced nutritious food. Breastfeeding is one of the most effective strategies to ensure a child's health and survival. Breast milk is the ideal food for infants that is safe, clean, and contains protective antibodies against various common childhood illnesses (Lyons et al., 2020). Breast milk provides all the energy and up to half of a child's nutrients that the infants need for the first month of life, and it continues to provide up to half or more of a child's nutritional needs during the second half of the first year, and up to one third during the second year of life (Lyons et al., 2020). Breastfed children had a higher result on intelligence tests, and had a lower risk of obesity and diabetes in the future. Women who breastfeed also had a lower risk of breast and ovarian cancers (WHO, 2021b). Therefore, improving nutritional status through providing adequate nutritional intake is needed for breastfeeding mothers, along with the provision of vitamin and mineral supplements. Adequate maternal nutritional status will have positive impacts on the child's nutritional status, particularly during the breastfeeding period.

Nutritional Status and Health Problems

This study found that the majority of children with no health problems had nutritional status in the normal range (85.7%). Adequate nutrition is essential for either healthy child growth or optimal physical and mental development. This study revealed that children without any illnesses were underweight (5.7%), and waste (8.6%). This might be a result of other contributing factors, including child characteristics, parental/household-related factors, and community/environmental factors (Obasohan et al., 2020). Child characteristics may include age, sex, birth weight, and feeding practices. Parental/household-related factors might be poverty, low maternal education, inadequate food intake, insufficient availability of food, poor breastfeeding practices, and insufficient parental knowledge. Community/environmental factors include poor and unhygienic food preparation and storage practices, non-potable water, abnormal mealtimes, food taboos, and growth and personal choices related to diet (Obasohan et al., 2020; Ansuya et al., 2018). Furthermore, the result of this study showed that most of the children with cough and influenza were in normal nutritional status (66.7%), however, it was also found that children with cough and influenza were underweight (13.3%), and waste (20%). The chi-square test found that there was a significant correlation between health problems and nutritional status (X^2 test=5.078, p-value=0,035, CI 95%=0.68-0.75). This study results are relevant to Ansuya et al. (2018) that found children with malnutrition had a 6.9 times higher risk of having recurrent colds and coughs. Another study showed that 54,5% of children under five with a history of infectious diseases suffered from undernutrition (Perdana et al., 2020). Malnutrition weakens the immune system, resulting in children more vulnerable to infectious diseases. Malnourished children have less nutritional reserves to grow properly and to fight off infections, which decreases their immune system function and increases the frequency and severity of infections (Pecora et al., 2020). Malnutrition also might lead to a delay in the recovery process, which can result in a potentially lethal cycle of exacerbating illness and deteriorating nutritional status (UNICEF, 2023).

V. CONCLUSION

In conclusion, malnutrition cases, waste, were found in the Warse Jetsy Diocese of Agats. The major health problem was Acute Respiratory Tract Infection. This might be related to maternal factors, such as lack of knowledge and negative health behaviors; and environmental factors, including limited access to health services. There was a correlation between the nutritional status of children under five and health problems, X^2 test 5,078, p-value 0,035 ($\alpha < 0,05$); CI 95% (0,68-0,75). It is recommended that further studies need to identify a nursing care model to increase nutritional status in Paris Warse Jetsy Diocese of Agats. To prevent and decrease the risk of infectious diseases and malnutrition, it is important to conduct intersectoral collaboration among the health department, public and infrastructure department, agricultural department, social workers, Diocese of Agats, and educational institutions. Health workers should be committed to providing and improving health promotion and services for local people, particularly, children and women. The government should improve the infrastructure, especially roads and bridges to promote accessible health services. Social workers should conduct workshops for health volunteers and cadres about how to produce nutritional foods from natural and local resources. The agriculture department should conduct training for local people on rice cultivation or other staple foods to provide food security.

Health Problems and Nutritional Status among Children Under-Five Years in Diocese of Agats: A Cross-Sectional Study

REFERENCES

1) Allender, J., Rector, C., Rector, C., & Warner, K. (2013). Community & public health nursing: Promoting the public's health. Lippincott Williams & Wilkins.

2) Amadu, I., Seidu, A. A., Duku, E., Frimpong, J. B., Jnr, J. E. H., Aboagye, R. G., ... & Ahinkorah, B. O. (2021). Risk factors associated with the coexistence of stunting, underweight, and wasting in children under 5 from 31 sub-Saharan African countries. BMJ open, 11(12), e052267. http://dx.doi.org/10.1136/bmjopen-2021-052267

3) Anderson, E. T., & McFarlane, J. M. (2015). Community as partner: Theory and practice in nursing. Philadelphia, PA: Wolters Kluwer.

4) Ansuya, Nayak, B. S., Unnikrishnan, B., George, A., N, S. Y., Mundkur, S. C., & Guddattu, V. (2018). Risk factors for malnutrition among preschool children in rural Karnataka: a case-control study. BMC Public Health, 18, 1-8. https://doi.org/10.1186/s12889-018-5124-3

5) Batticaca, F.B., & Kristina, Y. (2017). Praktek Profesi Keperawatan Komunitas Sebagai Model Pendidikan Dalam Pengembangan Kampung Sehat di Kampung Skouw Muara Tami Kota Jayapura (Unpublished research). Universitas Cenderawasih, Jayapura

6) Casadei, K., & Kiel, J. (2022). Anthropometric Measurement. In: StatPearls. StatPearls Publishing, Treasure Island (FL). PMID: 30726000.

7) Edelman, C., & Kudzma, E. C. (2021). Health promotion throughout the life span-e-book. Elsevier Health Sciences.

8) Gwela, A., Mupere, E., Berkley, J. A., & Lancioni, C. (2019). Undernutrition, host immunity and vulnerability to infection among young children. The Pediatric Infectious Disease Journal, 38(8), e175. doi: 10.1097/INF.0000000000002363

9) Kemenkes RI. (2016). Pedoman Umum Indonesia Sehat Dengan Pendekatan Keluarga. Jakarta: Kementerian Kesehatan RI

10) Kemenkes RI. (2018). Buku Saku Pemantauan Status Gizi Tahun 2017. Jakarta: Direktorat Jenderal Kesehatan Masyarakat Kementerian Kesehatan RI

11) Kemenkes RI. (2019). Laporan nasional riskesdas 2018. Jakarta: Kemenkes RI

12) Keuskupan Agats-Asmat. (2020a). Sejarah Kami. Retrieved from: https://keuskupanagats.or.id/sejarah/

13) Keuskupan Agats-Asmat. (2020b). Visi Misi. Retrieved from: https://keuskupanagats.or.id/visi-misi/

14) Leba, E. E., (2018, January 29). Hingga Januari 2018, Sebanyak 12.398 Anak Asmat Diperiksa. *Kompas*. Retrieved from https://www.kompas.id/baca/nusantara/2018/01/29/hingga-januari-2018-sebanyak-12-398-anak-asmat-diperiksa?open_from=Tagar_Page

15) Lundy, K. S., & Janes, S. (2009). Community health nursing: Caring for the public's health. Jones & Bartlett Learning.

16) Lyons, K. E., Ryan, C. A., Dempsey, E. M., Ross, R. P., & Stanton, C. (2020). Breast milk, a source of beneficial microbes and associated benefits for infant health. Nutrients, 12(4), 1039. https://doi.org/10.3390/nu12041039

17) Marilyn, R., Friedman, B., & Vicky, R. J. (2019). Family nursing: Research, theory, and practice. Pearson.

18) Maryunani. (2013). Clean and Healthy Behavior (PHBS). Jakarta: CV Trans Info Media (TIM)

19) Miller, J. E., & Rodgers, Y. V. (2009). Mother's education and children's nutritional status: new evidence from Cambodia. Asian Development Review, 26(1), 131-165. https://doi.org/10.7282/T3WQ05W4

20) Nies, M. A., & McEwen, M. (2014). Community/public health nursing-E-book: promoting the health of populations. Elsevier Health Sciences.

21) Obasohan, P. E., Walters, S. J., Jacques, R., & Khatab, K. (2020). Risk factors associated with malnutrition among children under-five years in sub-Saharan African countries: a scoping review. International journal of environmental research and public health, 17(23), 8782. https://doi.org/10.3390/ijerph17238782

22) Pecora, F., Persico, F., Argentiero, A., Neglia, C., & Esposito, S. (2020). The role of micronutrients in support of the immune response against viral infections. Nutrients, 12(10), 3198. https://doi.org/10.3390/nu12103198

23) Pemerintah Provinsi Papua (2019). Ringkasan Rencana Pembangunan Jangka Menengah Daerah Provinsi Papua (2019-2023). Jayapura: Badan Perencanaan Pembangunan Daerah Provinsi Papua. Retrieved from https://bappeda.papua.go.id/file/974499547.pdf

24) Perdana, H. M., Darmawansyih, D., & Faradilla, A. (2020). Gambaran Faktor Risiko Malnutrisi pada Anak Balita di Wilayah Kecamatan Tamalanrea Kota Makassar Tahun 2019. UMI Medical Journal, 5(1), 50-56. https://doi.org/10.33096/umj.v5i1.74

25) Puffer, R. R., & Serrano, C. V. (1973). Patterns of mortality in childhood: report of the Inter-American Investigation of Mortality in Childhood (No. 262). Pan American Health Organization.

26) Sianipar, T. (2018, March 12). Kematian anak akibat gizi buruk di Asmat berlanjut meski KLB sudah berakhir. *BBC Indonesia*. Retrieved from https://www.bbc.com/indonesia/indonesia-43363665

27) Siddiqui, F., Salam, R. A., Lassi, Z. S., & Das, J. K. (2020). The intertwined relationship between malnutrition and poverty. Frontiers in Public Health, 8, 453. https://doi.org/10.3389/fpubh.2020.00453

28) Sigdel, A., Sapkota, H., Thapa, S., Bista, A., & Rana, A. (2020). Maternal risk factors for underweight among children under-five in a resource limited setting: A community based case control study. Plos one, 15(5), e0233060. https://doi.org/10.1371/journal.pone.0233060

29) Tran, I. C., Gregory, C., O'Connor, P., Imohe, A., Do, L. A. H., & Suchdev, P. S. (2023). A scoping review on the associations and potential pathways between malnutrition and measles. MedRxiv, 2023-01. https://doi.org/10.1101/2023.01.21.23284872

30) UNICEF. (2023). Child Malnutrition. Retrieved from: https://data.unicef.org/topic/nutrition/malnutrition/

31) Wali, N., Agho, K. E., & Renzaho, A. M. (2021). Wasting and associated factors among children under 5 years in five south asian countries (2014–2018): Analysis of demographic health surveys. International Journal of Environmental Research and Public Health, 18(9), 4578. https://doi.org/10.3390/ijerph18094578

32) WHO. (2017). Diarrhoeal disease. Retrieved from https://www.who.int/news-room/fact-sheets/detail/diarrhoeal-disease

33) WHO. (2021a). Levels and trends in child malnutrition: UNICEF.

34) WHO. (2021b). Global breastfeeding scorecard 2021: protecting breastfeeding through bold national actions during the COVID-19 pandemic and beyond (No. WHO/HEP/NFS/21.45). World Health Organization.

35) WHO. (2023). Malaria. Retrieved from https://www.who.int/news-room/fact-sheets/detail/malaria

36) Widiantoro, W. (2018, January 17). Humanitarian Missions Rolling In Various sides, from government offices, to military and private organizations, are carrying out humanitarian missions in Asmat. *Kompas*. Retrieved from https://www.kompas.id/baca/english/2018/01/17/humanitarian-missions-rolling-in

37) Widiantoro, W. (2018, February 2). Clean Water Supply and Sanitation Prioritized. *Kompas*. Retrieved from https://www.kompas.id/baca/english/2018/02/02/clean-water-supply-and-sanitation-prioritized?open_from=Tagar_Page

38) Zandstra, J., Jongerius, I., & Kuijpers, T. W. (2021). Future biomarkers for infection and inflammation in febrile children. Frontiers in Immunology, 12, 631308. https://doi.org/10.3389/fimmu.2021.631308